

**Revision of the *Erebia radians* species-group  
from Tian-Shan and Pamiro-Alai regions**

(Lepidoptera, Satyridae)

by

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**Summary:** Three related species are observed: *Erebia radians* STAUDINGER, 1886, *E. progne* GRUM-GRSHIMAILO, 1890 and *E. sokolovi* LUKHTANOV, 1990, **stat. nov.** Existing distinctions between these species include also differences in the male and female genitalia. Five new subspecies are described: *E. radians zhdankoi* **subspec. nov.** (Inner Tian-Shan), *E. radians uzungyrus* **subspec. nov.** (Kirgizsky Mts.), *E. sokolovi severa* **subspec. nov.** (West Kokshaal Mts.), *E. sokolovi colorata* **subspec. nov.** (Naryn region in the Inner Tian-Shan) and *E. sokolovi arcana* **subspec. nov.** (Dzhetim-Bel Mts.).

**Резюме:** Данный обзор охватывает три вида эребий, населяющих горы Алая и Тянь-Шаня: *Erebia radians* STAUDINGER, 1886, *E. progne* GRUM-GRSHIMAILO, 1890 и *E. sokolovi* ЛУХТАНОВ, 1990, **stat. nov.** Видовые отличия между ними подтверждены на уровне гениталий самцов и самок. Описано пять новых подвигов: *E. radians zhdankoi* **subspec. nov.** (Внутр. Тянь-Шань), *E. radians uzungyrus* **subspec. nov.** (Киргизский хр.), *E. sokolovi severa* **subspec. nov.** (зап. юасть хр. Кокшаал), *E. sokolovi colorata* **subspec. nov.** (горы вокруг Нарына) и *E. sokolovi arcana* **subspec. nov.** (хр. Джетим-Бегь).

#### Introduction

The first taxa belonging to this species group were named by STAUDINGER, but he actually described only *Erebia radians* (1886). It should be noted that prior to STAUDINGER some taxa (also of other *Erebia* species) were described by LANG (1884) who likewise used the names and specimens from STAUDINGER. His book was practically forgotten. WARREN too did not mention this work although both authors lived and worked in London. However, TSHIKOLOVETS (1997) changed the names attributed by these authors basing on the earlier publication of LANG. We cannot agree with TSHIKOLOVETS without reservation. Taking into consideration that the author's names remained unchanged for more than 100 years we must keep in mind article 23 (b) of the ICZN where the purpose of the principle of priority is outlined. It is stipulated that this principle cannot be applied to change the permanent names of taxa in all cases. If the author admits that such a change would infringe the stability of zoological nomenclature, he should preserve the present names and wait for the Commission's decision. So, we shall preserve the author's names according to WARREN's revision.

HEYNE (1895) described two forms using STAUDINGER catalogue names and specimens: *E. radians* var. *usgentensis* and *E. radians* var. *magna*. GRUM-GRSHIMAILO described *E. radians* var. *progne* (1890). WARREN published a well-known revision devoted to genus *Erebia*, where *usgentensis* and *magna* were considered as aberrations and *progne* as a form of *E. radians*. We assert that WARREN had no working material at all from Tian-Shan.

# Colour plate I

CHURKIN, S. V. & V. A. Tuzov: Revision of the *Erebia radians* species-group from Tian-Shan and Pamiro-Alai regions (Lepidoptera, Satyridae). – *Atalanta* **31** (1/2): 87–112.

Fig. 1: *E. radians radians*, ♂, W. Transalai, Altyn-Dara r., Aram-Kungei vall., 3000–3300 m, 5.VII.1989, leg. S. CHURKIN.

Fig. 2: *E. radians radians*, ♂, East Alai, upper stream of Alaiku r., Kashkasu loc., 2900 m, 15.VII.1992, leg. G. SAMODUROV.

Fig. 3: *E. radians radians*, ♀, Transalai, Altyn-Dara r., Aram-Kungei vall., 3000–3300 m, 10.VII.1994, leg. L. CHURKINA.

Fig. 4: *E. radians zhdankoi* subsp. nov., holotype ♂, Int. Tian-Shan, SW edge of At-Bashi Mountains, near Chatyr-Kel L., Karasu r., 3700–3900 m, 24.–27.VII.1998, S. CHURKIN leg.

Fig. 5: *E. radians zhdankoi* subsp. nov., paratype ♂, same data.

Fig. 6: *E. radians zhdankoi* subsp. nov., paratype ♀, same data.

Fig. 7: *E. radians uzungyrus* subsp. nov., holotype ♂, Tian-Shan, Kirgizsky Mts., Uzungyr, Chon-Kurchak r., 2700 m, 15.VII.1991.

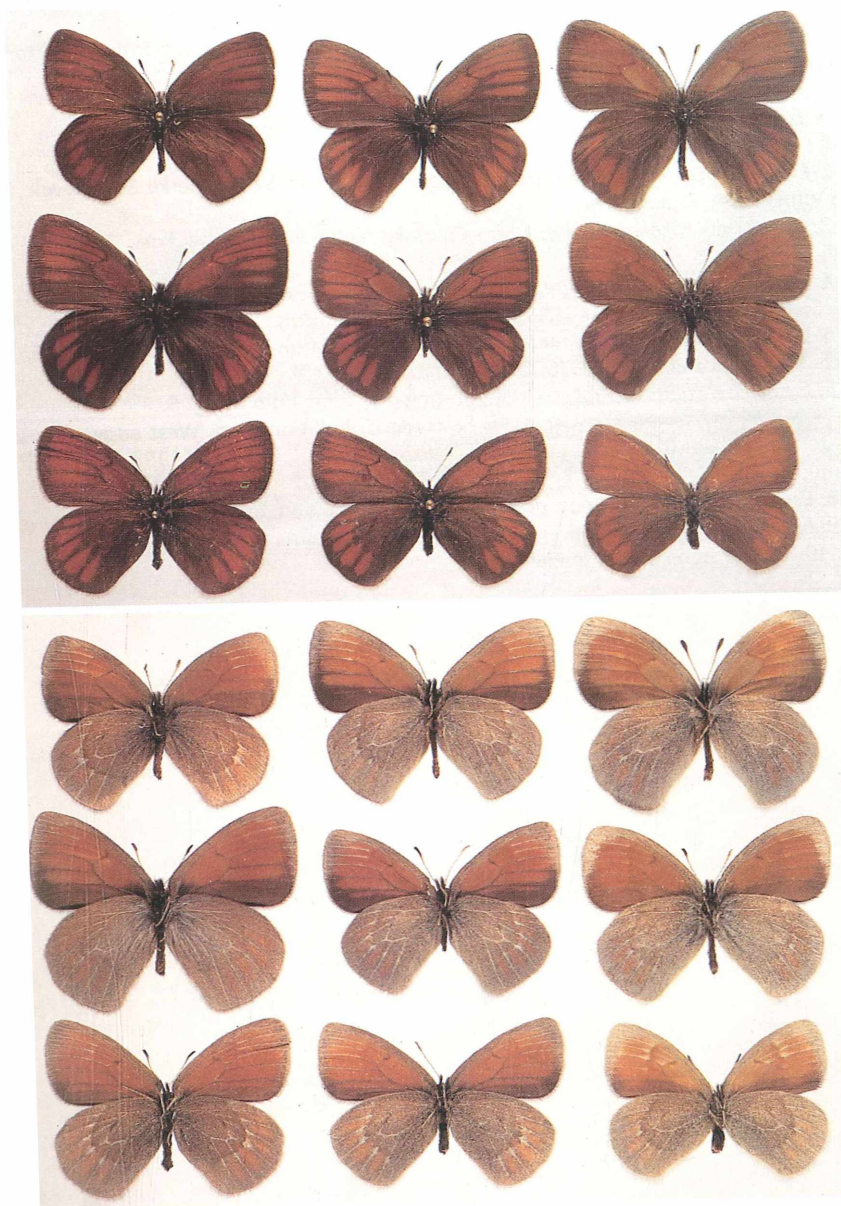
Fig. 8: *E. radians uzungyrus* subsp. nov., paratype ♂, Kirgizsky Mts., Shamsi Pass, 2800 m, 7.VII.1983, V. GANSON leg.

Fig. 9: *E. radians uzungyrus* subsp. nov., paratype ♀, same data as in fig. 8.

Figs. 10–18: the same as 1–9, undersides.

1	4	7
2	5	8
3	6	9
10	13	16
11	14	17
12	15	18

### Colour plate I



## Colour plate II

CHURKIN, S. V. & V. A. Tuzov: Revision of the *Erebia radians* species-group from Tian-Shan and Pamiro-Alai regions (Lepidoptera, Satyridae). – *Atalanta* **31** (1/2): 87–112.

Fig. 1: *E. sokolovi sokolovi*, ♂, Tian-Shan, Talassky Alatau Mts., Alabel Pass, 3800 m, 29.VII.1991, I. PLUSHCH leg.

Fig. 2: *E. sokolovi sokolovi*, ♂, Tian-Shan, Kirgizsky Mts., 30 km S from Merke, Sandyk vall., 3200 m, 6.VIII.1998, A. ZHDANKO leg.

Fig. 3: *E. sokolovi sokolovi*, ♂, Tian-Shan, Talassky Alatau Mts., Alabel Pass, 3200 m, 14.VII.1997.

Fig. 4: *E. sokolovi colorata* subsp. nov., holotype ♂, Int. Tian-Shan, Moldo-Too Mts., 10 km S from Song-Kel L., Moldoo Pass, 23.VII.1998, A. GROMENKO leg.

Fig. 5: *E. sokolovi colorata* subsp. nov., paratype ♂, Int. Tian-Shan, Baidulu Mts., Dolon Pass, 3200–3250 m, 25.VI.–14.VII.1976, G.SAMODUROV leg.

Fig. 6: *E. sokolovi colorata* subsp. nov., paratype ♀, same data as fig. 5.

Fig. 7: *E. sokolovi severa* subsp. nov., holotype ♂, Int. Tian-Shan, West edge of Kokshaal Range, Sary-Beles Mts., upper stream of Kuldzha-Bashi r., 18.–21.VII.1998, 3700–3800 m, S. CHURKIN leg.

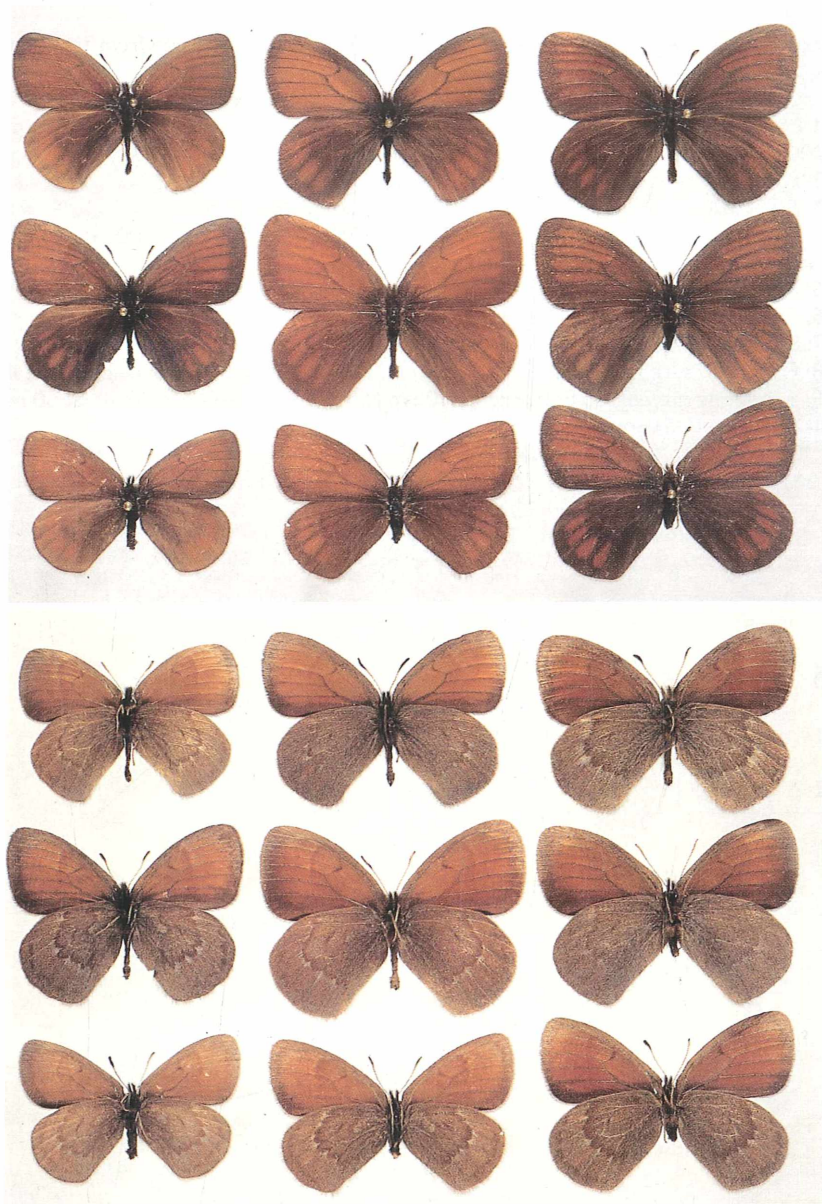
Fig. 8: *E. sokolovi severa* subsp. nov., paratype ♂, same data as fig. 7.

Fig. 9: *E. sokolovi severa* subsp. nov., paratype ♀, same data as fig. 7.

Figs. 10–18: the same as 1–9, undersides.

1	4	7
2	5	8
3	6	9
10	13	16
11	14	17
12	15	18

## Colour plate II



# Colour plate III

CHURKIN, S. V. & V. A. TUZOV: Revision of the *Erebia radians* species-group from Tian-Shan and Pamiro-Alai regions (Lepidoptera, Satyridae). – *Atalanta* **31** (1/2): 87–112.

Fig. 1: *E. sokolovi arcana* subsp. nov., holotype ♂, Tian-Shan, Dzhetim-Bel Mts., Ekurgun-Kel L., 3700–4000 m, 5.–12.VII.1993, V. VASILIEV leg.

Fig. 2: *E. sokolovi arcana* subsp. nov., paratype ♂, same data as fig. 1.

Fig. 3: *E. sokolovi arcana* subsp. nov., paratype ♀, same data as fig. 1.

Fig. 4: *E. progne samodurovi*, paratype ♂, Transalai Mts., Kyzyl-Art Pass, 4000 m, 14.VII.1981, G. SAMODUROV leg.

Fig. 5: *E. progne samodurovi*, paratype ♂, same data as fig. 4.

Fig. 6: *E. progne samodurovi*, paratype ♀, same data as fig. 4.

Fig. 7: *E. progne progne*, ♂, Alai Mts., Taldyk Pass, 27.VII.1989, 3700 m, I. PLUSHCH leg.

Fig. 8: *E. sokolovi severa* subsp. nov., paratype ♀, same data as fig. 9 of colour plate II.

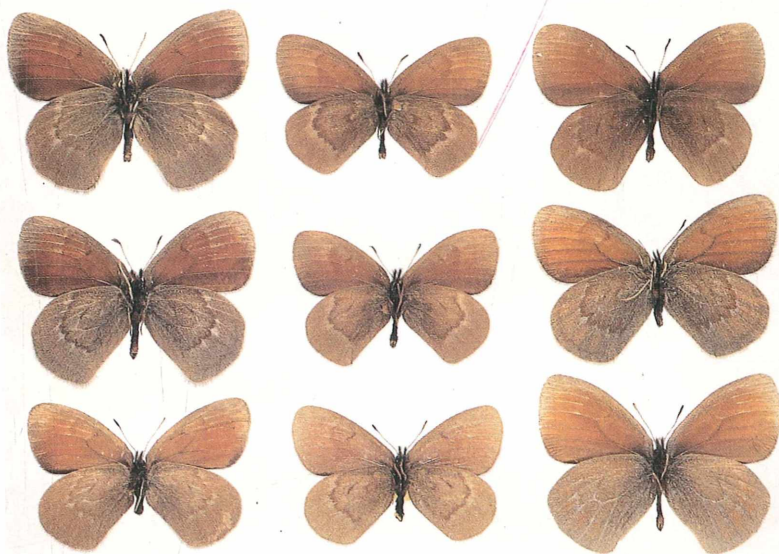
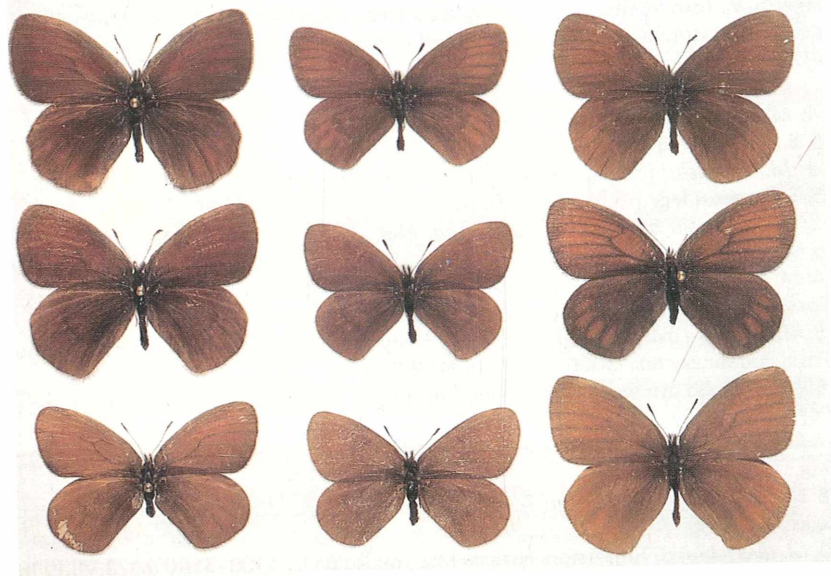
Fig. 9: *E. radians radians*, ♂, E. Transalai, 10 km N. from Kyzyl-Art Pass, 3750–3850 m, 10.–15.VII.1981, leg. G. SAMODUROV.

Figs. 10–18: the same as 1–9, undersides.

1	4	7
2	5	8
3	6	9
10	13	16
11	14	17
12	15	18



### Colour plate III



Only in 1990 LUKHTANOV described the taxon *sokolovi* as a subspecies of *E. radians* from Kirgizsky Mts. He had mistakenly included in the paratype series several specimens from Dolon Pass, Baidulu Mts. The description is very short but the main differences are evident: developed median band and marginal dark wavy line on the HW underside.

In 1992 the last known taxon of the group, *E. progne samodurovi* TSHIKOLOVETS was described. In this article *E. progne* was defined as a bona species but without real diagnosis. Moreover, the author included in *progne* all populations not similar to *E. radians radians* (the taxon *sokolovi* was not mentioned but material from corresponding localities considered as *progne*). Until recent time the situation has been very confused and the determination of species in many faunistic works is doubtful (see synopsis). For example, butterflies from Dolon Pass were considered at first as *sokolovi* by LUKHTANOV, than as *progne* by TSHIKOLOVETS while BOGDANOV (in: Tuzov et al., 1997) and LUKHTANOV (1994) again mentioned them as *E. r. radians*.

After investigation and dissection of many specimens from Alai and Tian-Shan we discovered that *Erebia sokolovi* LUKHTANOV is a good species and the nominate subspecies is distributed in the Kirgizsky and Talassky Mts. while the butterflies from the Inner Tian-Shan represent another subspecies. It is confirmed also that *E. progne* is a good species.

The principal distinctions of *E. radians* are as follows:

- Median band on the HW underside is not developed while the basal dark line is always absent in males and females; the median dark line often more or less reduced;
- HW underside without marginal dark line or traces of such a line but with clear red elongated touches on the submarginal part of the wing; HW remarkably silver-scaled;
- veins forming a cell on the HW underside are silver-whitish and distinctively visible on the ground colour;
- red colour on the upperside brighter and saturated if compared with other species;
- the anal angle of the HW is developed;
- male genitalia: spined ridge is shorter, density of spines is not high, inner surface of the distal blade of valva without spines.

Distinctive features of *E. sokolovi* are the following:

- Median band on the HW underside is developed, including a basal dark line; the last one is reduced sometimes but visible in males and always presented in females;
- veins forming a cell on the HW underside are obscured and not well visible, the underside darker and more gray, silver scaling not so developed;
- the marginal dark line is visible (sometimes only in traces) in males and always developed in females;
- upperside darker, even when the reddish area is large—the color not so saturated;
- the anal angle is visible but not so developed; the whole shape of the wings is narrower, so that the males usually resemble females of *E. radians* (especially in the Inner Tian-Shan subspecies);
- male genitalia: spined ridge is longer, density of spines is obviously higher, spines present on the inner surface of the tip of valva;

Other differences of minor importance or not so visible will be treated in the descriptions.



In view of the fact, that TSHIKOLOVETS is confusing *E. sokolovi* and *E. progne* we have to define how the latter species—*progne*—is distinguished from the two others:

Median band is developed but the marginal line is absent in both sexes;

HW without developed anal angle so that usually the anal side of the HW is practically straight;

upperside is very dark; HW red spots invisible or with straight internal sides and sharp external ones;

male genitalia: spined ridge is very long: the length of the dorsal side of the valva without spines not longer (usually shorter) than the length of the spined ridge.

Female genitalia provide a very good distinction but it is meaningful to examine genitalia structure in detail (male genitalia included) in a separate part to follow. The reason is that the structure itself must be described first. In the final part (discussion) we will summarize all facts.

The type material of the new taxa will be deposited mainly in the Zoological Museum of the Moscow State University. Some paratypes of *E. r. uzungyrus* are presented in the collections of V. GANSON, S. SAZONOV, S. TOROPOV, V. SINYAEV and G. SAMODUROV; paratypes of *E. s. colorata* in the collections of S. SAZONOV and G. SAMODUROV. All other paratypes, besides the museum collection, are preserved in the private collections of the authors.

#### Abbreviations

FW      fore wings

HW      hind wings

TL      type locality

#### Systematic part

*Erebia radians radians* STAUDINGER, 1886

#### Records

"*E.[rebia] Radians*, STGR." – LANG (1884: 320).

"*Ereb.[ia] Radians* STGR." – STAUDINGER (1886: 240). TL: Alai.

"*[Erebia] Radians* v. *Usgentensis*" RÜHL – TL: Usgent.

"*[Erebia] Radians* STGR. (= v. *Usgentensis* (STGR.) RÜHL)" – STAUDINGER (1901: 50).

"*[Erebia] radians* STGR." – EIFFINGER (1907: 111, pl. 35c, d).

"*[Erebia] radians* STGR. *usgentensis* STGR." – EIFFINGER (1907: 112).

"*[Erebia] radians* STGR. ab. *magna* STGR." – EIFFINGER (1907: 112).

"*Erebia radians usgentensis* RÜHL" – FILIPJEV (1931: 147).

"*[Erebia] radians* STAUDINGER" – GAEDE (1931: 642).

"*[Erebia] radians* STAUDINGER ab. *magna* STGR." – GAEDE (1931: 642).

"*[Erebia] radians* STAUDINGER var. *usgentensis* RÜHL" – GAEDE (1931: 642).

"*Erebia radians* STAUDINGER" – WARREN (1936: 212 (partim), pl. 80, figs. 1082, 1086, 1088).

"*[Erebia radians* STAUDINGER] ab. *usgentensis* HEYNE" – WARREN (1936: 213, pl. 80, figs. 1081).

- "[*Erebia radians* STAUDINGER] ab. *magna* HEYNE" – WARREN (1936: 213, pl. 80, figs. 1087).  
 "[*Erebia*] *radians* STAUDINGER, 1886" – KORSCHUNOV (1972: 149—partim).  
 "*Erebia radians* STAUDINGER, 1886" – D'ABRERA (1992: 164—partim).  
 "*Erebia radians radians* STAUDINGER, 1886" – TSCHIKOWEZE (1992: 181, Taf. X, fig 1).  
 "*Erebia radians radians* STAUDINGER, 1886 (= *uzgentensis* HEYNE, 1894)" – TUZOV (1993: 32—partim).  
 "*Erebia radians radians* STAUDINGER, 1886" – LUKHTANOV (1994: 106—partim).  
 "*Erebia usgentensis* HEYNE in RÜHL, 1894" – LUKHTANOV (1994: 107).  
 "*Erebia radians* STAUDINGER, 1886" – TUZOV et al. (1997: 210, pl. 51, fig. 16).  
 "*Erebia radians radians* H. C. LANG, 1884" TSCHIKOWEZE (1997: 83, Pl. XXXVI, figs 25–26, Pl. XXXVII, figs 25–26).  
 "*Erebia radians radians* STAUDINGER, 1886" – HANUS et al. (1997: 90—partim).

## Material

6 ♂♂, 2 ♀♀, Transalai, Altyn-Dara r., Aram-Kungei vall., 3000–3300 m, 5.VII.1989, leg. S. CHURKIN; same loc.; 3 ♂♂, 1.VII.1993, leg. S. DIALEKTOV; same loc., 7 ♂♂, 2 ♀♀, 10.VII.1994, leg. L. CHURKINA; 4 ♂♂, East Alai, upper stream of Alaiku r., Kashkasu loc., 2900 m, 15.VII.1992, leg. M. MARKHASEV; 9 ♂♂, 4 ♀♀, same data, leg. G. SAMODUROV; 1 ♂, Alai, Taldyk Pass, 3700 m, 29.VII.1989, leg. I. PLUSHCH; 1 ♂, Alai, Tengizbai Pass, 3800 m, 13.VIII.1981, L. SELIVANOV leg.; 15 ♂♂, Transalai, 10 km N. from Kyzyl-Art Pass, 3750–3850 m, 10.–15.VII.1981, leg. G. SAMODUROV.

## Description

♂. Forewing length 23–25 mm, in butterflies from Kyzyl-Art 22–23 mm. Upperside dark-brown with a non-contrasting reddish area, which includes the cell and 5 spots between darkened veins. Veins and narrow space around veins darkened but not contrasting because the reddish colour is not so bright. Postdiscal space around Cu-veins and bordered part of the cell obscured. Sometimes this dark suffusion covers the whole cell, sometimes it remains totally reddish. Thus, the reddish spots between Cu-veins are reduced in the postdiscal part, the inner side of these spots being more or less narrowed, even sharp. The reddish spots between M-veins are always not obscured. The external side of all marginal reddish spots is prominent but not very noticable. Spot between Cu2 and 2A is usually not developed. HW upperside is dark with 5 reddish elongated and tear-shaped spots. The external side of the spots is slightly prominent. The anal angle is well developed with a slight silver dusting. FW underside with large reddish spot, discal black line and silver dusting on the apex and the costal side. Submarginal parts of M-veins also with silver scaling; the submarginal part of the wing is in general lighter. HW underside more or less densely dusted with silver scaling. All veins are visibly white and distinctive even on silver suffusion. The discal black line is small, short and thin; it is usually extended from the base of M2-vein towards the base of M3. The black median line is usually more or less visible. The whitish suffusion developed on the external side of this median line is separately aggregated on the veins. The marginal part without any traces of a marginal dark line but with 5 contrasting red elongated spots that may infringe the median line. In rare cases the spots are not contrasting when they are covered by silver scales of unusual density. In such cases the internal part of the wing is only slightly contrasting to the external part. Commonly the internal part is darker than the external one; the silver suffusion does not mask the red spots.

♂-genitalia: valva – fig. 2 (c, k, l, d, h, i, j) and fig. 6 (a, d); aedeagus – fig. 5 (a, b). The proportion of the length of the spined ridge to the dorsal not-spined length is 0.65 : 1. It is to be noted that each valva on fig. 2 regardless of whether its view side is corresponding to separate specimens—and this is to show the great variability of shape and structures. Other important characteristics are the same as shown for other subspecies (see figs. 1a and 4a).

♀. FW length 22–24 mm. The size is smaller, wing length 20–24 mm. The shape of the wings is narrower than in the male. The red colour on the upperside is brighter, the black suffusion on the postdiscal parts of Cu-veins is not so developed and not displayed on the cell which is reddish. Red spot between Cu2 and 2A veins is well visible. The underside is similar to the male, but brighter and the red spots are also brighter. Genitalia: fig. 7 (b, c, g, h). It is necessary to note that the small differences in the postvaginal plate between specimens from Transalai and from the Eastern edge of the Alai Mts. (Alaiku River) are not those between populations—both figures (b, c) display the individual variability which has been noted for both populations.

### Biology

The nominate subspecies is widely distributed in the Alai and Transalai Mountains occurring on steep slopes of dry alpine grassland in July at altitudes from 2800–3800 m.

### Taxonomical notes and variations

Comparing many butterflies from different localities, one can easily find that the coloration becomes increasingly brighter from the West to the East. On the other hand, the series collected, for instance, in the Transalai in different years have different cell's coloration. The butterflies originating from the East differ also by a less developed median black line and discal line. But we presume, that this distinction is not subspecific: similar specimens have been found to occur in all populations. Such an eastern form with reduced black lines was described as *f. usgentensis* HEYNE and fairly determined by WARREN as an infrasubspecific form. We can say that on the one hand this form might be intermediate between *E. r. radians* and *E. r. zhdankoi*, and, on the other hand, it is still the nominate subspecies because of some reasons to be considered below.

As WARREN put it, he had some specimens from Uzgent with normal coloration. Our series (from Alaiku River) has been collected near Uzgent in the same mountain area connecting the eastern edge of Alaisky Range and the Southern part of Fergansky Mts. This series comprises selected number of specimens in which the coloration is gradually changing from typical *radians* to *f. usgentensis*. Meanwhile the population differs from *E. r. zhdankoi* which is characterized by a bright red colour (commonly with orange hue) much contrasting with the ground colour and by the distinctively prominent external sides of spots on the upperside. The wing shape of specimens from the Eastern Alai is the same as in typical *E. radians*.

There are much more differences between the three subspecies under consideration than between the population from the eastern edge of Alai and other Alai and Transalai populations. The same is true for the local population from Kyzyl-Art, where butterflies are smaller and darker (the cell is always dark and the reddish colour is darkened to such an extent that it becomes visible). This distinction is a result of the high altitude and it is not specific. Butterflies collected at higher altitude are smaller and darker in all parts of the area where the subspecies occur. Of course, if other populations of this butterfly are discovered in the future in high Transalai the necessity will arise to describe this form as the darkest subspecies of *E. radians*.

Geographical points provide another indication that there is no need to separate f. *uzgentensis* as a subspecies. It is more reasonable to consider the butterflies from the Alai mountain system as one subspecies and butterflies from the Inner Tian-Shan as another subspecies.

As lectotype of *usgentensis* [HEYNE], [1895] we designate the specimen which is figured in the work by WARREN (1936) on photo 1081 (pl. 80) with the label "Usgent" This specimen was sent as *usgentensis* by STAUDINGER.

#### Etymology

"radians" can be translated as radiant.

#### *Erebia radians zhdankoi* subsp. nov.

Holotype ♂: Inn. Tian-Shan, SW edge of At-Bashi Mountains, near Chatyr-Kel L., Karasu r., 3700–3900 m, 24.–27.VII.1998, S. CHURKIN leg.

Paratypes: same data, 44 ♂♂, 21 ♀♀, S. CHURKIN & A. ZHDANKO leg.; 27 ♂♂, 20 ♀♀, same data, V. Tuzov leg.; 20 ♂♂, 5 ♀♀, same data, A. ZHDANKO leg.; 9 ♂♂, 2 ♀♀, Fergansky Mts., Bergut Pass, 2850 m, 15.VII.1998, V. DOLIN leg.

#### Description and diagnosis

♂: holotype FW length 23 mm, paratypes 21–23.5 mm. Easily distinguished from the nominate subspecies by the very bright colour of the red spots contrasting with the ground colour and often with orange hue. The cell is fully red, the dark suffusion on the postdiscal parts of the Cu-veins' red spots is not dense. Thus, these spots are less reduced than in the nominate race but usually narrowing toward the cell. The veins and space around the veins are visibly darkened and well contrasting with the red space. The red spot between Cu<sub>2</sub> and 2A is developed (only one specimen without this spot). Marginal sides of the red spots are well prominent, even sharp. Red spots on the FW upperside have a more elongated-triangular shape, usually sharply prominent on the external (marginal) side. The underside is more silver-scaled, red spots more contrasting, the discal line slightly smaller (less developed). The wing shape is slightly but distinctively different from that of *E. r. radians*: wings are shorter and wider, the anal angle of the HW is more noticeable; the whole shape of the butterfly appears to be slightly extended vertically.

Genitalia similar to those of the nominate subspecies (fig. 1c, fig. 5c), valva statistically slightly longer and spined ridge shorter (figs. 2e, f, g; fig. 6b), proportion is 0.55–0.6 1 (7 specimens measured).

♀: FW length 20–23 mm. Brighter than the male and with all the specific and subspecific characteristics. The dark suffusion on the postdiscal parts of the Cu-veins is practically invisible. Genitalia (figs. 7a, e, f) similar to those of the nominate subspecies.

#### Distribution and biology

Butterflies from both known localities are quite similar without real differences. Statistically specimens from Fergansky Mts. have a more reduced dark median line on the HW underside. HW underside in series from At-Bashi has a more developed median line, sometimes resembling that of butterflies from the West Transalai.

Butterflies were collected at a higher altitude than the nominate subspecies but the biotope was the same—steep slopes of dry mountain grassland. Butterflies were observed to occur together with *Melitaea minerva* and *Colias regia*.

#### Etymology

This subspecies was named after ALEXANDER ZHDANKO, a well-known professional entomologist who has discovered it during our expedition in Tian-Shan.

### *Erebia radians uzungyrus* subsp. nov.

#### Records

"*Erebia radians radians* STAUDINGER, 1886 (= *uzgentensis* HEYNE, 1894)" Tuzov (1993: 32—partim).

"*Erebia usgentensis* HEYNE in RÜHL, 1894" – LUKHTANOV (1994: 107, Taf. 21, fig. 1).

"*Erebia usgentensis* HEYNE, [1894]" – Tuzov et al. (1997: 210 (partim), pl. 51, figs. 13–15).

"*E.[rebia] r.[adians] usgentensis* HEYNE, 1894" – HANUS et al. (1997: 90).

"*Erebia radians sokolovi* LUKHTANOV, 1990" – KOROLEV & KIRYANOV (1998: 22).

Holotype ♂: Tian-Shan, Kirgizsky Range, Uzungyr Mts., Chon-Kurchak r., 2700 m, 15.VII.1991.

Paratypes: 1 ♂, same data; 2 ♂♂, same data, V. SINYAEV leg.; 11 ♂♂, same loc., 2500–2700 m, 25.VI.1990, S. TOROPOV leg.; 5 ♂♂, Kirgizsky Mts., Shamsi Pass, 2800 m, 7.VII.1983, V. GANSON leg.; 18 ♂♂, 1 ♀ same data, S. SAZONOV leg.

#### Description and diagnosis

♂. Holotype's wing length 24 mm, paratypes from Uzungyr 24 mm, from Shamsi 22–23 mm. This butterfly can be easily recognized. Veins on the FW upperside are not so dark, slightly silver-scaled, so the red area is practically not separated by spots, and the darkness around veins is reduced. The external sides of spots between veins are not distinctively prominent and never sharp. The density of dark scales on the postdiscal parts of the red area between Cu-veins is not high; dark scales are practically invisible in the holotype and sometimes slightly developed in other specimens from Uzungyr. In the paratypes from Shamsi Pass this suffusion is commonly very well developed so that the red colour is absent here and the border between dark and red zones is straight, i. e. the inner sides of these red spots are not narrowed (nevertheless, 2–3 specimens are similar to the butterflies from Uzungyr). The red colour between Cu2 and 2A is reduced. HW upperside with not so elongated spots as in other subspecies, the marginal sides of the spots are not prominent, forming one line. The underside with very dense silver scaling, so that on the HW the median line and discal line are usually absent, even the red spots are not so well visible. Butterflies from Shamsi are slightly darker, the dark lines not so much reduced. It is noteworthy, that in specimens whose discal line is slightly visible, this line is longer than in other subspecies and it is extended towards the base of the R5-vein.

Genitalia (figs. 1a, g; figs. 2a, b) are different from the nominate subspecies in the length of the spined ridge which is the same as in *E. sokolovi*. Other distinctions are typical for this species: valva without spines on the inner surface of the distal blade (fig. 6c), the proximal part of the spined ridge is narrowed (fig. 4a). It is also interesting to note that the distal blade of the valva is always finger-shaped.

♀ (FW length 21 mm) similar to the male except for the usual elements of dimorphism. All borders of the red spots on the upperside are rounded, practically not narrowing. The red spots on the HW upperside are not elongated, practically not triangular with more or less straight lateral sides. Genitalia (figs. 7d, i) with unusual characteristics to be treated later.

#### Distribution and biology

This butterfly is known only from Kirgizsky Mts. being very local and very rare in collections. *E. r. uzungyrus* may be a good species differing from *E. radians* by the composition of the red area and some distinctions in genitalia, but this perception needs to be substantiated by biological aspects. Butterflies occur on the alpine grasslands together with *Melitaea uitashica* and *Parnassius patricius uzungyrus*.

#### Etymology

Uzungyr is a mountain chain between Alamedin and Chon-Kurchak Rivers southward from Bishkek.

*Erebia sokolovi sokolovi* LUKHTANOV, 1990

#### Records

"*Erebia radians sokolovi* ssp. n." – LUKHTANOV (1990: 13, fig. 1 (1). TL: ?).

"*Erebia progne* GRUM-GRZHIMAILO, 1890" – TSCHIKOLOWEZ (1992: 181—partim).

"*Erebia radians sokolovi* LUKHTANOV, 1990" – TUZOV (1993: 32).

"*Erebia radians sokolovi* LUKHTANOV, 1990" – LUKHTANOV (1994: 107).

"*Erebia radians sokolovi* LUKHTANOV, 1990" – TUZOV et al. (1997: 210, pl. 51, fig. 17).

"*Erebia radians radians* STAUDINGER, 1886" – HANUS et al. (1997: 90—partim).

#### Material

1 ♂, Tian-Shan, Kirgizsky Mts., 30 km S from Merke, Sandyk vall., 3200 m, 6.VIII.1998, A. ZHDANKO leg.; 3 ♂♂, Tian-Shan, Talassky Alatau Mts., Alabel Pass, 3800 m, 29.VII.1991, I. PLYUSHCH leg.; 7 ♂♂, 6 ♀♀, same loc., 14.VII.1997; 5 ♂♂, Talassky Alatau, Otmek Pass, 3400 m, 1.VII.1997, DOLIN V. leg.

#### Description

♂. FW length 19–21 mm. FW upperside is dark with non-contrasting reddish area, including the cell. The red colour in the cell and nearby is strongly darkened (sometimes practically totally dark) and the submarginal part of the reddish area is distinctively brighter than the internal part. The border between these two parts is more or less straight and visible. The darkened vein is not contrasting with the reddish area. Only the submarginal part of the reddish area is slightly separated by darkness around the vein, but the external sides of the spots are not visibly narrowed and prominent. The red spot between Cu2 and 2A is not developed. HW upperside with 4–5 reddish spots not so elongated as in *E. radians* (usually more than twice longer than wider); internal sides of spots are prominently rounded—they are not narrowed and sharp as in *E. radians* but not straight as in *E. progne*. The anal angle is developed in opposite to *E. progne*, the silver scaling is not visible. FW underside with discal line, reddish area darkened in the basal and postdiscal parts but the submarginal part is brighter and veins have gray



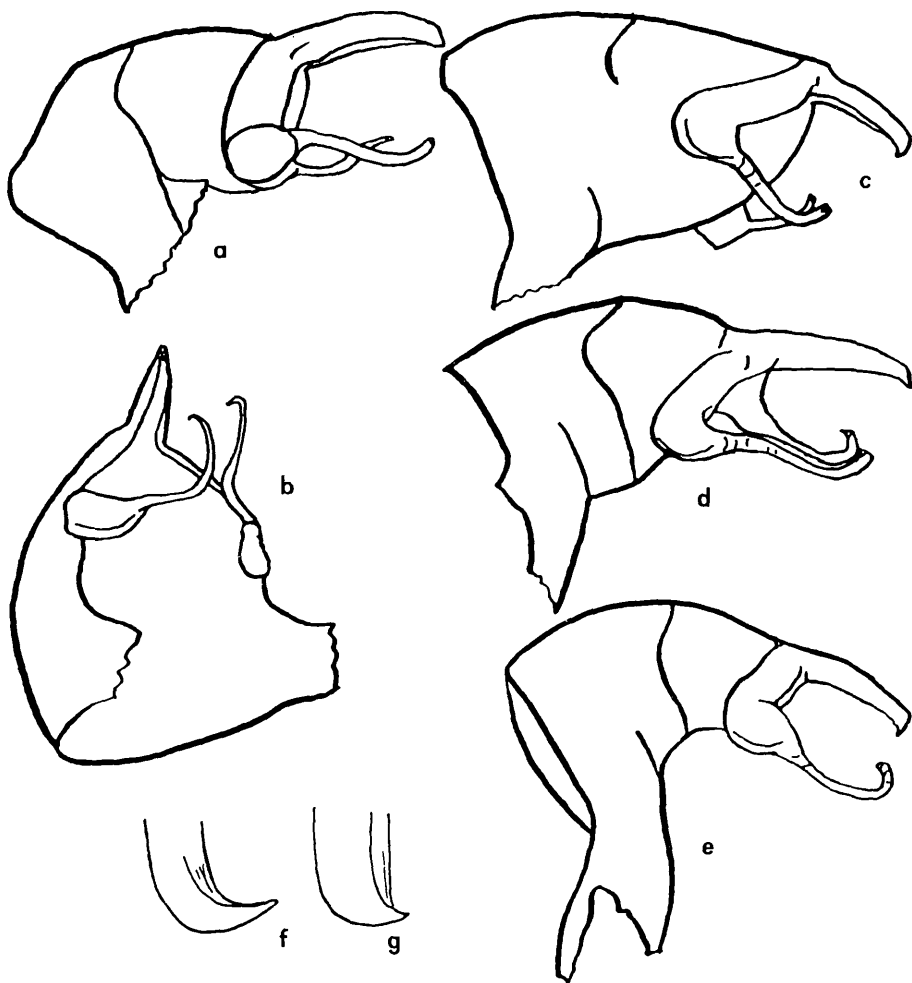


Fig. 1: Male genitalia. Uncus, brachia, tegumen - a, b, c, d, e; tip of the brachia - f, d. a, g - *E. radians uzungyrus* (Kirgizsky Mts., Uzungyr); b, f - *E. sokolovi sokolovi* (Talassky Mts., Alabel Pass); c - *E. radians zhdankoi* (At-Bashi Mts.); d - *E. sokolovi colorata* (Moldo-Too Mts.); e - *E. sokolovi arcana* (Dzhetim-Bel Mts.).

suffusion. Important to note that this characteristic is represented in all taxa of this group (including *E. radians*) but only in this subspecies it is so well developed. Light scaling also covers the apex and the costal side but it is not dense and silver coloured as in *E. radians*. HW underside with whitish-gray suffusion which is not dense. The submarginal and postdiscal parts of

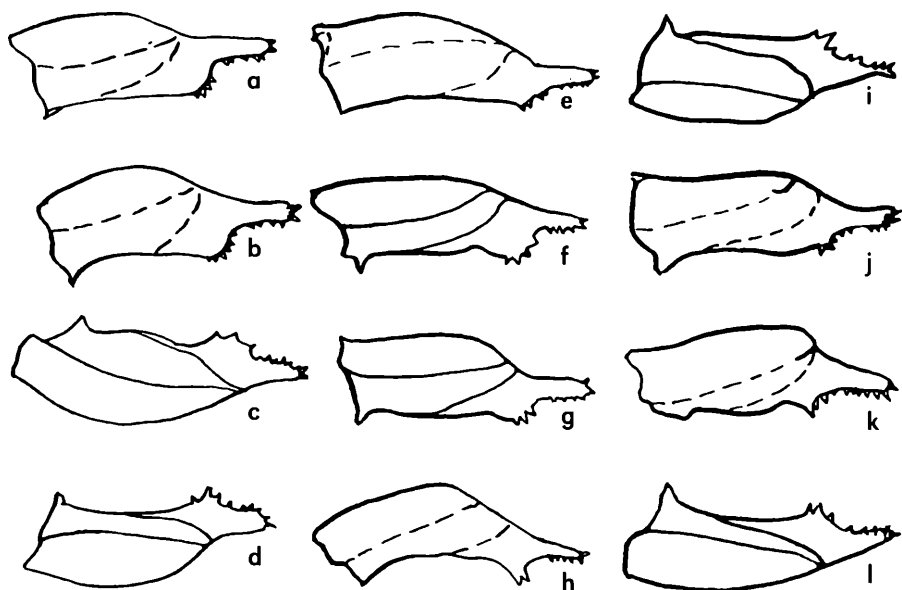


Fig. 2: Valva. Lateral view - a, b, e, h, j, k; inside lateral view - c, d, f, g, i, l.

a, b - *E. radians uzungyrus* (Kirgizsky Mts., Uzungyr); c, k, l - *E. radians radians* (East Alai, Alaiku r.); d, h - *E. radians radians* (Taldyk Pass); e, f - *E. radians zhbankoi* (At-Bashi Mts.); g - *E. radians zhbankoi* (Fergansky Mts.); i, j - *E. radians radians* (W. Transalai).

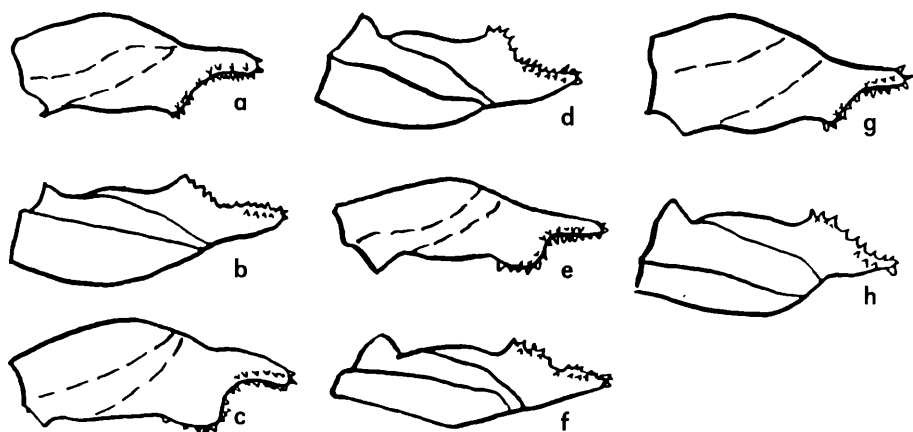


Fig. 3: Valva. Lateral view - a, c, e, g; inside lateral view - b, g, f, h.

a - *E. sokolovi sokolovi* (Talassky Mts., Alabel Pass); b - *E. sokolovi sokolovi* (Kirgizsky Mts., Sandyk r.); c, d - *E. sokolovi colorata* (Moldo-Too Mts.); e, f - *E. sokolovi severa* (W. Kokshaal Mts., Sary-Beles); g, h - *E. sokolovi arcana* (Dzhetim-Bel Mts.).

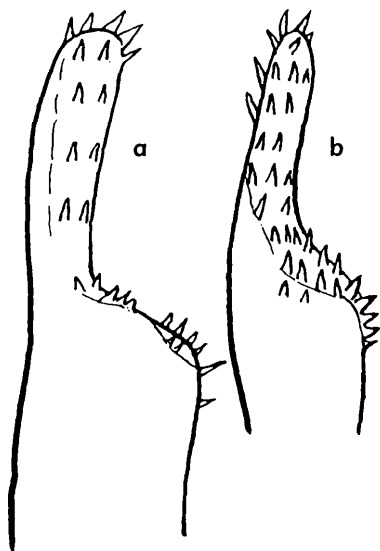


Fig. 4: Distal part of the valva, from above. a - *E. radians uzungyrus* (Kirgizsky Mts., Shamsi Pass), b - *E. sokolovi sokolovi* (Kirgizsky Mts., Sandyk r.).

the veins are usually whitish but the parts which form the cell are always darkened and not contrasting with the ground colour. The median band is well developed. The basal line is reduced very rarely (only in one specimen), in this case the whole wing is darkish. The median line with very little but visible whitish suffusion forming 1–3 spots on the veins. The distinctive dark line across the marginal side of the wing is developed. This marginal line is composed of convex segments between the veins. The veins here are whitish but not much. There are 1–3 enlightenments with a reddish hue presented sometimes in the submarginal part—usually not distinctive. The discal line is visible and usually longer than in *E. radians*; it lies between the bases of the R5 and M2 veins, sometimes elongated to the base of the Cu1 vein (in *E. radians* the part between R5 and M1 is usually reduced).

Genitalia. Uncus and brachia: fig. 1b, f; valva: fig. 3a, b and fig. 6e; valva above: fig. 4b; aedeagus: fig. 5e. The uncus is visibly shorter than in *E. r. uzungyrus*. The brachia are thin with narrowed and sharp ends.

♀. FW length 18–20 mm. Similar to the male, but smaller, the dull reddish area comprising the space between CU2 and 2A and the cell, but the basal and discal parts are obscured. The underside is similar but brighter; median band and marginal line are always well visible. Genitalia: figs. 8a, f, g, h.

### Biology and variation

This is a very uniform butterfly without great variability as far as the red area or size development are concerned. The distribution area covers the eastern part of the Talassky Alatau and the western half of the Kirgizsky Mts., where the size of specimens is slightly larger. We have no records related to the eastern part of the Kirgizsky Mts. The geographical isolation of this subspecies (if confirmed) may allow to separate the butterflies from the Inner Tian-Shan as a good species, furthermore, as some differences in genitalia, form of red area and marginal band on the HW underside are available. We have no true information about the biology of this subspecies.

### Etymology

BORIS MIKHAILOVICH SOKOLOV – Russian amateur entomologist.

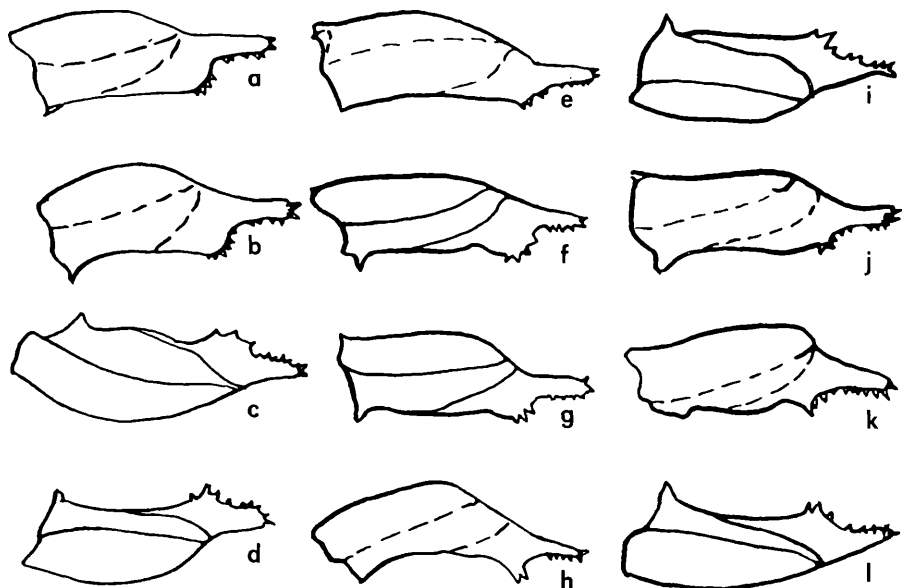


Fig. 2: Valva. Lateral view – a, b, e, h, j, k; inside lateral view – c, d, f, g, i, l.  
a, b – *E. radians uzungyrus* (Kirgizsky Mts., Uzungyr); c, k, l – *E. radians radians* (East Alai, Alaiku r.); d, h – *E. radians radians* (Taldyk Pass); e, f – *E. radians zhdankoi* (At-Bashi Mts.); g – *E. radians zhdankoi* (Fergansky Mts.); i, j – *E. radians radians* (W. Transalai).

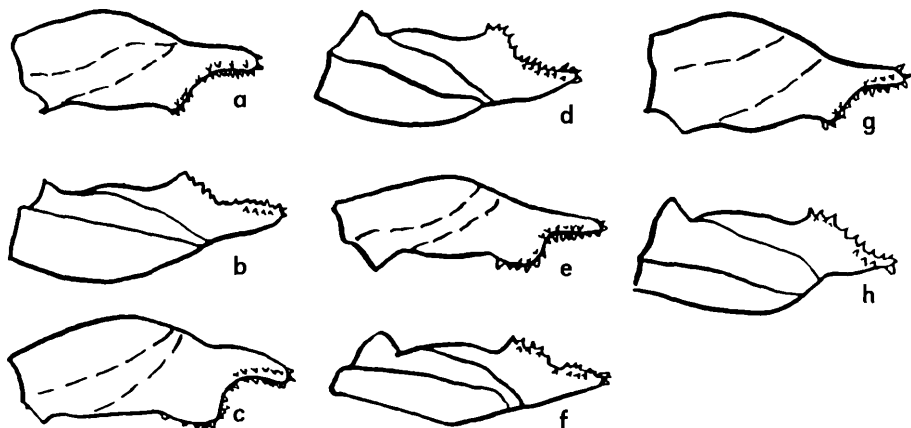


Fig. 3: Valva. Lateral view – a, c, e, g; inside lateral view – b, g, f, h.  
a – *E. sokolovi sokolovi* (Talassky Mts., Alabel Pass); b – *E. sokolovi sokolovi* (Kirgizsky Mts., Sandyk r.); c, d – *E. sokolovi colorata* (Moldo-Too Mts.); e, f – *E. sokolovi severa* (W. Kokshaal Mts., Sary-Beles); g, h – *E. sokolovi arcana* (Dzhetim-Bel Mts.).

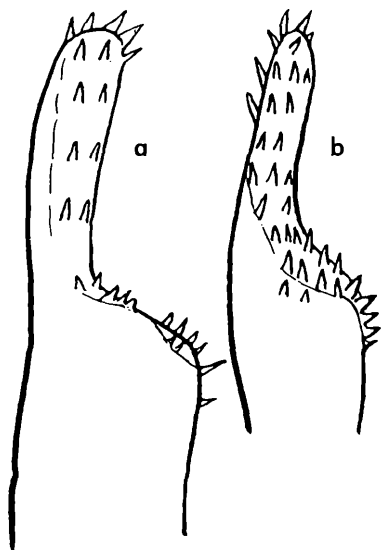


Fig. 4: Distal part of the valva, from above. a - *E. radians uzungyrus* (Kirgizsky Mts., Shamsi Pass), b - *E. sokolovi sokolovi* (Kirgizsky Mts., Sandyk r.).

the veins are usually whitish but the parts which form the cell are always darkened and not contrasting with the ground colour. The median band is well developed. The basal line is reduced very rarely (only in one specimen), in this case the whole wing is darkish. The median line with very little but visible whitish suffusion forming 1-3 spots on the veins. The distinctive dark line across the marginal side of the wing is developed. This marginal line is composed of convex segments between the veins. The veins here are whitish but not much. There are 1-3 enlightenments with a reddish hue presented sometimes in the submarginal part—usually not distinctive. The discal line is visible and usually longer than in *E. radians*; it lies between the bases of the R5 and M2 veins, sometimes elongated to the base of the Cu1 vein (in *E. radians* the part between R5 and M1 is usually reduced).

Genitalia. Uncus and brachia: fig. 1b, f; valva: fig. 3a, b and fig. 6e; valva above: fig. 4b; aedeagus: fig. 5e. The uncus is visibly shorter than in *E. r. uzungyrus*. The brachia are thin with narrowed and sharp ends.

♀. FW length 18-20 mm. Similar to the male,

but smaller, the dull reddish area comprising the space between CU2 and 2A and the cell, but the basal and discal parts are obscured. The underside is similar but brighter; median band and marginal line are always well visible. Genitalia: figs. 8a, f, g, h.

### Biology and variation

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### Etymology

BORIS MIKHAILOVICH SOKOLOV - Russian amateur entomologist.

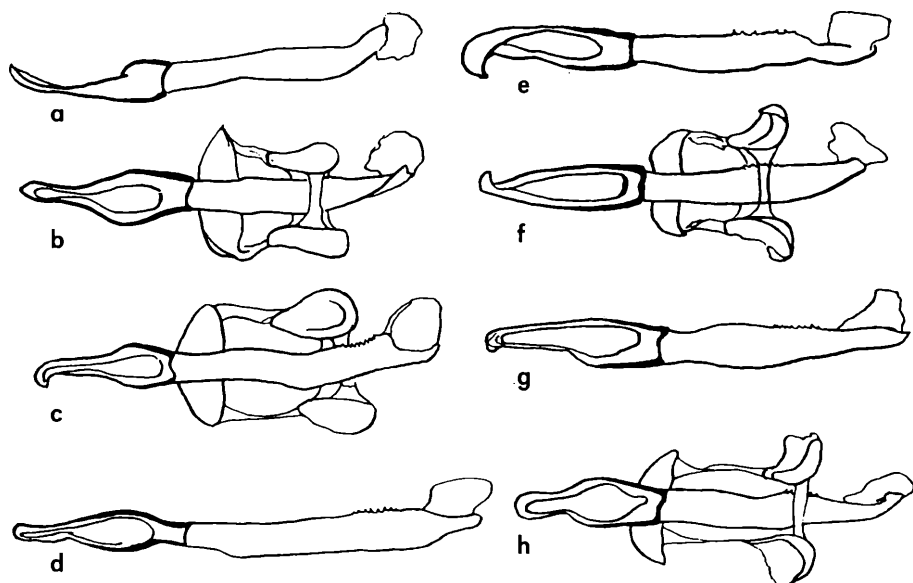


Fig. 5: Aedeagus. a, b – *E. radians radians* (W. Transalai); c – *E. radians zhdankoi* (At-Bashi Mts.); d – *E. radians uzungyrus* (Kirgizsky Mts., Shamsi Pass); e – *E. sokolovi sokolovi* (Kirgizsky Mts., Sandyk r.); f – *E. sokolovi colorata* (Baidulu Mts., Dolon Pass.); g – *E. sokolovi severa* (W. Kokshaal Mts., Sary-Beles); h – *E. sokolovi arcana* (Dzhetim-Bel Mts.).

*Erebia sokolovi severa* subsp. nov.

Holotype ♂: Int. Tian-Shan, West edge of Kokshaal Range, Sary-Beles Mts., upper stream of Kuldzha-Bashi r., 18.–21.VII.1998, 3700–3800 m, S. CHURKIN leg.

Paratypes: 19 ♂♂, 6 ♀♀, same data, CHURKIN leg.; 21 ♂♂, 8 ♀♀, same data, V. Tuzov leg.; 7 ♂♂, same data, A. ZHDANKO leg.

Description

♂. Holotype FW length 23 mm, paratypes 22–24 mm. FW upperside with reddish area usually fully developed but darkened from the anal side, even in very dark specimens the cell is practically reddish—the colour here is duller but visible. The spot between Cu2 and 2A is present but reduced and noticeable mostly in the basal part. The veins and the space around the veins are dark, well contrasting with the reddish area and dividing the whole area into separate spots. The marginal sides of the spots are narrowing and prominent (similar to *E. r. zhdankoi*, but not much). It is to be noted that the discal line is not so developed as in the nominate subspecies. HW upperside is the same as in *E. s. sokolovi* but spots are brighter and distinctively more elongated. FW underside with whitish, even silver dusting. HW underside is visibly brighter than in the nominate subspecies, the whitish suffusion is not dense but with a silver



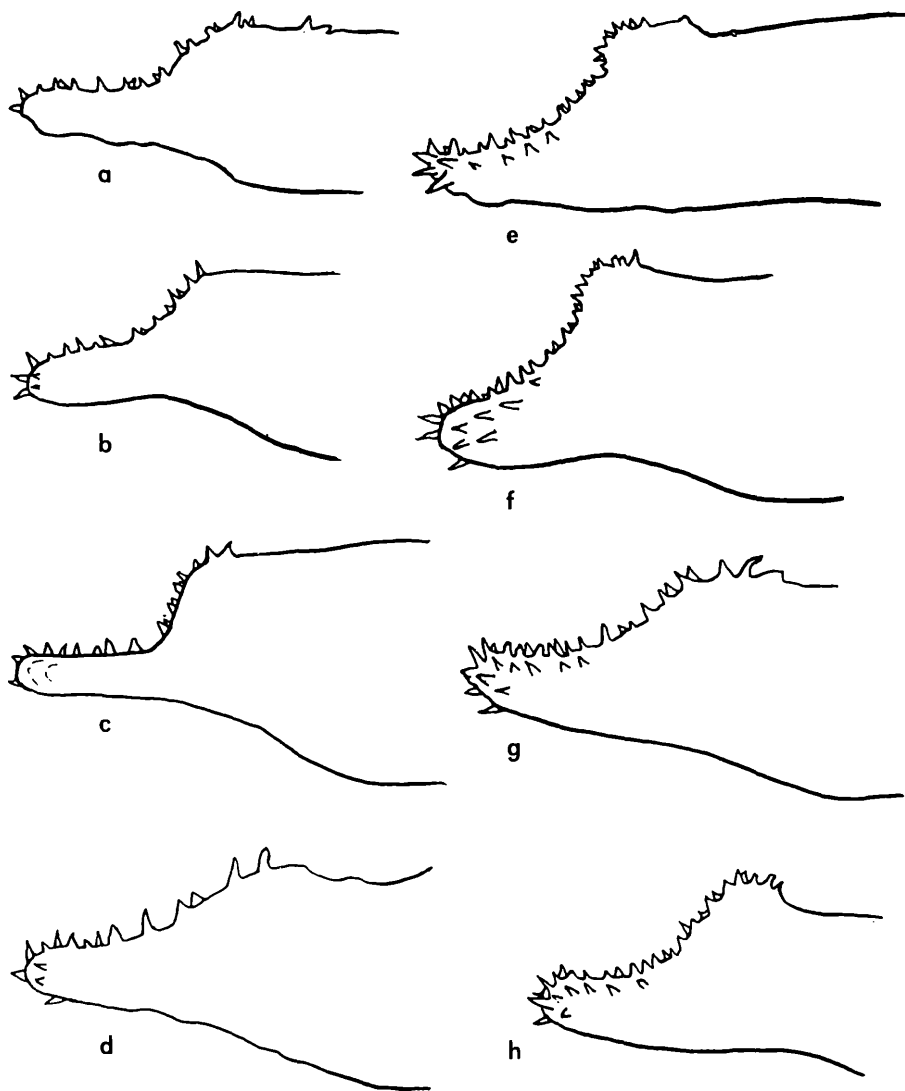


Fig. 6: Distal part of the valva, inside lateral view. a – *E. radians radians* (W. Transalai); b – *E. radians zhdankoi* (At-Bashi Mts.); c – *E. radians uzungyrus* (Kргызsky Mts., Uzungyr); d – *E. radians radians* (East Alai, Alaiku r.); e – *E. sokolovi sokolovi* (Talassky Mts., Alabel Pass); f – *E. sokolovi colorata* (Moldo-Too Mts.); g – *E. sokolovi arcana* (Dzhetim-Bel Mts.); h – *E. sokolovi severa* (W. Kokshaal Mts., Sary-Beles).

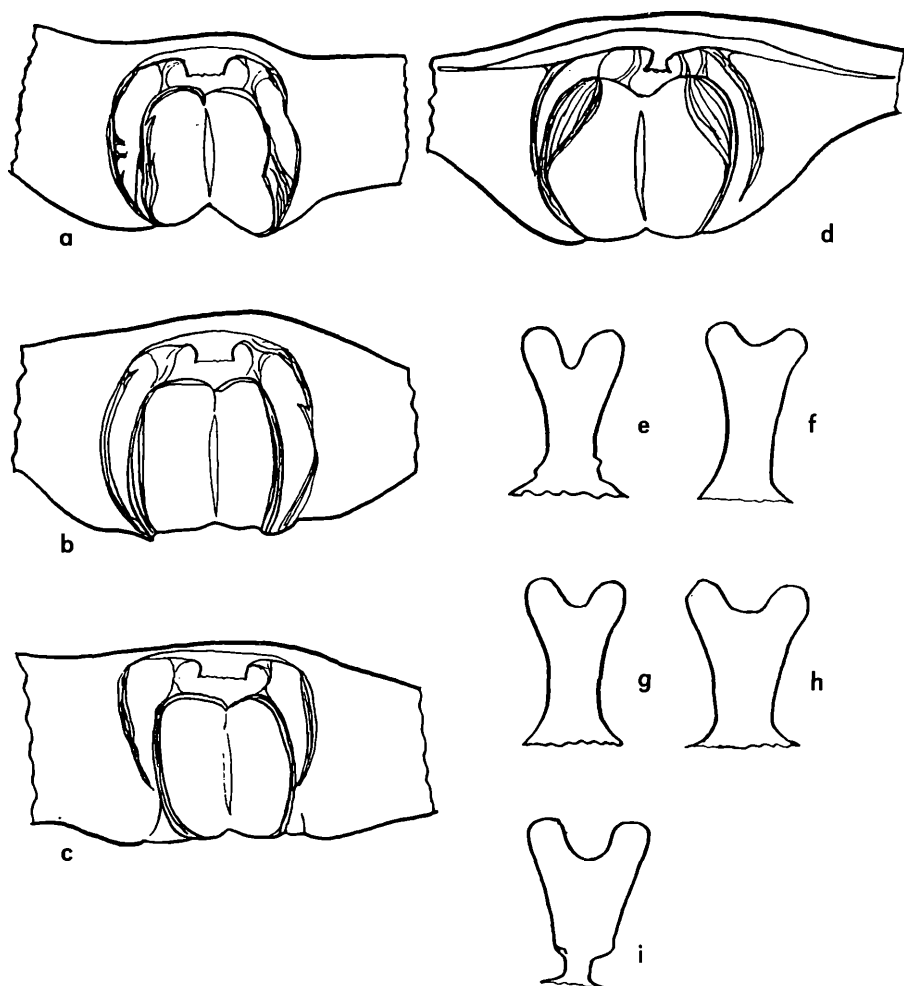


Fig. 7: Female genitalia, postvaginal plate – a, b, c, d and the “fork” – e, f, g, h, i.  
a, e, f – *E. radians zhdankoi* (At-Bashi Mts.); b, g – *E. radians radians* (W. Transalai); c, h – *E. radians radians* (East Alai, Alaiku r.); d, i – *E. radians uzungyrus* (Kirgizsky Mts., Uzungyr).

hue. The marginal dark line is reduced, in many specimens present only as traces. The space between the median band and this line has sometimes a reddish enlightenment which is not clear and only slightly visible. It is important to say that this space is evidently wider than in *E. s. sokolovi* and the submarginal line never consists of convex segments. The discal line is the

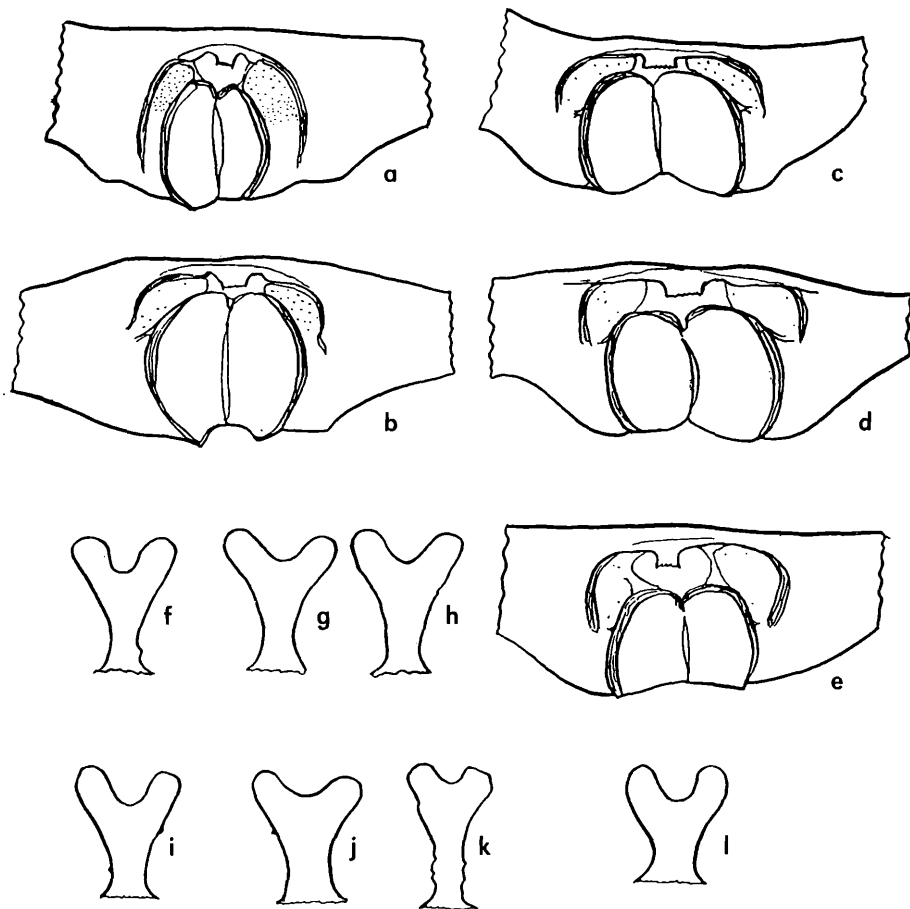


Fig. 8: Female genitalia, postvaginal plate – a, b, c, d, e and the “fork” – f, g, h, i, j, k, l.  
a, f, g, h – *E. sokolovi sokolovi* (Talassky Mts., Alabel Pass); b, k – *E. sokolovi arcana* (Dzhetim-Bel Mts.); c, i – *E. sokolovi colorata* (Baidulu Mts., Dolon Pass); d, j – *E. sokolovi severa* (W. Kokshaal Mts., Sary-Beles); e, l – *E. progne* (Kyzyl-Art Pass).

same as in *E. s. sokolovi*. The median band is developed but the basal line is often reduced and only slightly visible. The whitish suffusion of the median line is obviously wider and mostly not aggregated as spots, usually only on R5-vein. The veins are whitish only around the median line, the marginal and basal parts being obscured.

Genitalia. The uncus is similar to *E. radians*, but narrower at the distal end (it is very difficult to use this distinction in practice). The distal part of the brachia is not narrowed, even slightly,

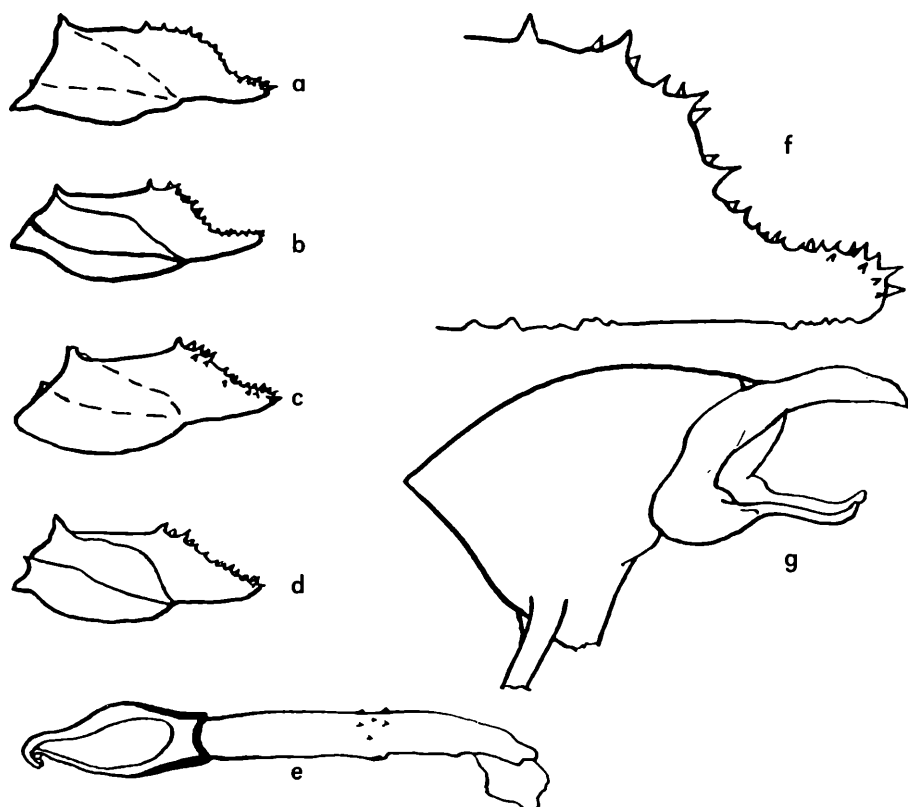


Fig. 9: *E. pragne*: a, b, g – Taldyk Pass; c, d, f, e – Kyzyl-Art Pass. Male genitalia: valva, lateral view – a, c; inside lateral view – b, d; distal part of the valva, inside lateral view – f; uncus and brachia – g; aedeagus – e.

with short tips sharpened at the end; the diameter is the same as in all other taxa of the group, excluding *E. s. sokolovi*. In whole this structure is very similar to that on fig. 1d. The valva figures on figs. 3e, f and fig. 6h, aedeagus—fig. 5g. Valva viewed from above as in the nominate subspecies.

♀. FW length 21–22 mm. Visibly brighter than the female of *E. s. sokolovi* and much larger. Same as the male (except for the usual elements of dimorphism), but redder, veins more contrasting but the external sides of the reddish spots are less prominent. Underside is brighter, but the marginal line and the median band are always developed. Only one female has no visible basal line (col. pl. 3, fig. 8) but all other distinctions exist. Genitalia (figs. 8d, j) with one important distinction in the structure of postvaginal plate if compared with *E. s. sokolovi*.

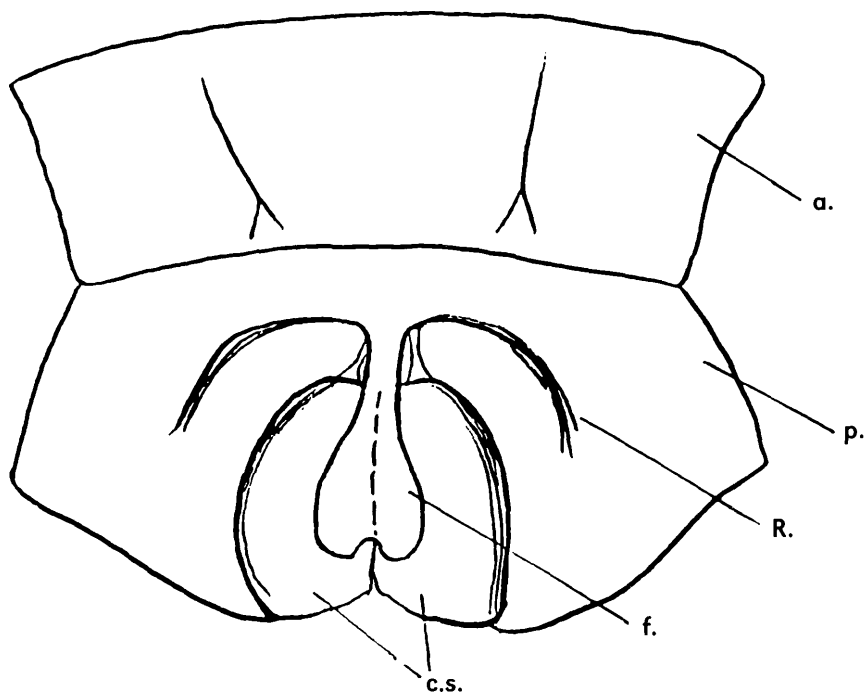


Fig. 10: Antevaginal (a.) and postvaginal (p.) plates of female genitalia of the group, scheme of the structure: c.s. – central rounded sclerites, r. – ridges, f. – “fork”

#### Diagnosis and variation

The butterfly is more variable than the nominate subspecies. We have one very bright specimen with fully bright red cell and two others which are very dark with a reduced reddish spot between the Cu-veins. This subspecies is much larger, the upperside is brighter. The contrast between the discal and postdiscal part of the reddish area is not visible on the upperside, the marginal dark line on the underside is more or less reduced and spots on the HW upperside are elongated (these three distinctions are present in all Inner Tian-Shan's subspecies). The main distinctions of this subspecies are as follows: veins on the FW underside are contrasting with the reddish colour and dividing the reddish area into separate spots; the underside is much brighter and silver-scaled (in *E. s. sokolovi* whitish-gray); the basal line on the underside is more or less reduced, especially in males. It is to be noted that the aberrant specimens mentioned above have a very common underside with all the specific and subspecific distinctions.

#### Distribution and biology

Butterflies occur on flattened humid slopes together with *Melitaea asteroidea* and *Colias staudingeri*. The distribution of this subspecies is unknown. We presume that this subspecies

has evolved under specific climatic conditions of the flattened high-altitude area (practically mountain plateau) between At-Bashi and West Kokshaal Mts.

*Erebia sokolovi colorata* subspec. nov.

Records

"*Erebia radians* STAUDINGER, 1886 " – D'ABRERA (1990: 164—ill.).

"*Erebia radians radians* STAUDINGER, 1886 (= *uzgentensis* HEYNE, 1894)" – Tuzov (1993: 32—partim).

"*Erebia radians radians* STAUDINGER, 1886 " – LUKHTANOV (1994: Taf. 21, fig. 3).

"*Erebia radians radians* STAUDINGER, 1886 " – HANUS et al. (1997: 90—partim).

"*Erebia radians* STAUDINGER, 1886 " – Tuzov et al. (1997: 210, pl. 51, fig. 18).

Holotype ♂: Int. Tian-Shan, Moldo-Too Mts., 10 km S from Song-Kel L., Moldoo Pass, 23.VII.1998, A. GROMENKO leg.

Paratypes: 6 ♂♂, same data, A. GROMENKO leg; 7 ♂♂, 2 ♀♀, same data, A. KOLESNICHENKO leg; 12 ♂♂, 6 ♀♀, Int. Tian-Shan, Baidulu Mts., Dolon Pass, 3200–3250 m, 25.VI.–14.VII.1976, G. SAMODUROV leg.; 2 ♂♂, same loc., 18.VII.1981, KAABAK leg.; 1 ♀, same loc., 3.VII.1978; 11 ♂♂, 1 ♀, same loc., 14.–16.VII.1981, S. SAZONOV leg.

Description and diagnosis

♂: Holotype FW length 22 mm, paratypes from Moldo-Too 21–22 mm, from Dolon Pass 21–24 mm; average 23 mm. The reddish area on the FW upperside is usually full developed (including the space between Cu2–2A), with a more or less orange hue which is dull however and not contrasting with the darkness nearby. This butterfly is very variable in size, but slightly bigger than *E. s. sokolovi* and slightly smaller than the previous subspecies. The development of the reddish area is also variable but even in very dark specimens the cell is fully reddish. The veins are dark but usually not darkened around and not contrasting with the reddish area. Dark specimens are similar to *E. r. severa* but it is visible that the external sides of the spots between the veins are practically not narrowed and prominent; veins are not so contrasting and the discal line on the FW upperside is not visibly dividing the cell spot and other spots. The underside is much more similar to *E. s. severa*, but darker and more gray. The whitish suffusion around the median dark line is not wide and aggregated as spots, usually three. The marginal line is slightly more developed but also not convex in segments; the space between this line and the median band as in *E. s. severa*. The basal line is always well visible; only in two specimens this line is not distinct.

Genitalia similar to those of *E. s. severa*, the total length of the valva is statistically slightly smaller and the total width is slightly bigger. Valva is figured on figs. 3c, d and fig. 6f, aedeagus on fig. 5f, uncus and brachia on fig. 1d. Valva viewed from above as in the nominate subspecies.

♀: FW length 21–23 mm. Similar to the female of *E. s. severa*, the dull reddish area on the FW upperside extending practically along the wing, and not divided into separate spots. The reddish spots on the HW upperside are darker and less notable—similar to those in *E. s. sokolovi*. Genitalia (figs. 8c, i) are very similar to those of *E. s. severa*.



### Distribution and biology

This subspecies is known from Dolon Pass and Moldo-Too Mts. Butterflies of the last locality are brighter and smaller. We presume that it will be discovered at least in Song-Kel Too, Kara-Goman, Narynsky and other ranges between At-Bashi and the western part of the Terskei Alatau. We have studied a good series from Zailiisky Alatau (Transili Mts.) but we had no opportunity to dissect specimens. These butterflies were very similar to *E. r. colorata*. This butterfly has been collected on more or less flattened and humid stony slopes together with *Melitaea minerva*. Altitude is always above 3000 m, but usually lower than 3600 m where *E. s. severa* is collected.

### Etymology

"Colorata" can be translated from Latin as "painted"

### *Erebia sokolovi arcana* subsp. nov.

### Records

"*Erebia progne* ssp.?" – Tschikolowez (1992: 181–182).

Holotype ♂: Tian-Shan, Dzhetim-Bel Mts., Ekurgun-Kel L., 3700–4000 m, 5.–12.VII.1993, V. VASILIEV leg.

Paratypes: 8 ♂♂, 1 ♀, same data, A. KULIKOV & V. VASILIEV leg.; 1 ♂, same loc., 17.VII.1987, 3600 m, D. TATARENKO leg.

### Description and diagnosis

♂: Holotype FW length 20.5 mm, paratypes 20–21 mm. The size is similar to that of the nominate subspecies. This is a small butterfly with obscured basal and discal parts of the reddish area but without contrast between these parts and the submarginal part. The marginal part of the reddish area is separated by veins, but veins are not contrasting and the external sides of the spots are not visibly prominent. The spots between Cu2 and 2A are reduced. HW upper side is very dark, the reddish spots are small, not elongated and sometimes not clearly visible. The underside is similar to *E. r. colorata*, but the colour is unusual: the silver suffusion is dense but with unclear golden-reddish shades as in *E. progne*. The anal angle is also slightly less developed than in other subspecies. The marginal line is present but even more reduced than in *E. s. severa*.

Genitalia are very similar to those of *E. s. severa* and *E. s. colorata*, but the valva is obviously shorter and wider. We dissected only 3 specimens but all have practically not curved basal parts of the brachia (fig. 1e), so that the brachia are visually longer than the uncus. We presume that it may be just a particular case. In all other subspecies the brachia are curved in the basal part towards the space under the uncus—curvature is variable but present; as a result the brachia are visually shorter than the uncus. Valva figures on figs. 3g, h and fig. 6g, aedeagus on fig. 5h.

♀. FW length 19 mm. The reddish colour duller than in the previous subspecies. Upperside is similar to the upperside of *E. s. sokolovi* but the underside without distinct marginal line is the same as in *E. s. colorata*. Marginal line is even more reduced; basal line is very well developed. Genitalia: fig. 8b, k.

## Distribution and biology

This is a high altitude butterfly occurring on swampy alpine grasslands together with *Colias staudingeri*. It is to be noted that this subspecies is unknown from Sary-Dzhaz River where many collectors had worked during the last twenty years.

## Etymology

"Arcana" can be translated from Latin as "redicant, reserved"

## *Erebia progne* GRUM-GRSHIMAILO, 1890

### Records

"*Erebia* nov. sp." – GRUM-GRSHIMAILO (1885: 247).

*Erebia progne* – GRUM-GRSHIMAILO (1890: ?) TL: Kaouk Pass, Kichik-Alai Mts.

"[*Erebia*] *Radians* STGR. v. *Progne* GR-GR." – STAUDINGER (1901: 50).

"[*Erebia*] *radians* STGR. *progne* GR-GRZH." – EIFFINGER (1907: 112).

"[*Erebia*] *radians* STAUDINGER ab. *progne* GRUM-GRSHIMAILO" – GAEDE (1931: 642).

"[*Erebia radians* STAUDINGER] f. *progne* GR-GR." – WARREN (1936: 213, pl. 80, fig. 1087).

"*Erebia progne samodurovi* subsp. nov." – TSHIKOLOVEZ (1992: 181, Taf. X, figs. 4–6 [non 7]).

"[*Erebia*] *progne progne* GRUM-GRSHIMAILO, 1890" – TUZOV (1993: 32).

"[*Erebia*] p.[rogne] *samodurovi* TSHIKOLOVEZ, 1992" – TUZOV (1993: 32).

"*Erebia progne* GRUM-GRSHIMAILO, 1890" – TUZOV et al. (1997: 210, pl. 52, figs. 19–21).

"*Erebia progne samodurovi* TSHIKOLOVEZ, 1992" – TUZOV et al. (1997: 210).

"*E.[rebia] progne progne* GRUM-GRSHIMAILO, 1890" – HANUS et al. (1997: 90).

"*Erebia progne samodurovi* TSHIKOLOVEZ, 1992" – TSHIKOLOVEZ (1997: 83, Pl. XVIII, figs. 10, 11, Pl. XIX, figs. 10, 11).

### Material

5 ♂♂, Alai Mts., Taldyk Pass, 27.VII.1989, 3700 m, I. PLUSHCH leg.; 15 ♂♂, 7 ♀♀, Transalai Mts., Kyzyl-Art Pass, 4000 m, 14.VII.1981, G. SAMODUROV leg.; 2 ♂♂, same loc., 19.VII.1982, E. TARASOV leg.

### Description

♂. We do not possess of good series of *E. p. progne* from Alai, so this description has been based on the series from Transalai—paratypes of *E. progne samodurovi* TSHIKOLOVETZ, especially because the differences between the subspecies are not so significant. This is a small, dark butterfly. FW length 17–20.5 mm, specimens from Taldyk 20.5–21.5 mm. Upperside is dark brown, FW with the reddish area usually very darkened in the basal and discal part. Only the submarginal part is clearly reddish but divided into separate spots by very obscured veins; this enlightenment is similar to that in *E. s. sokolovi*. The external (!) sides of the reddish spots are narrowed and even sharp. Very rarely the full reddish area is visible (very dull), in this case the line between the cell spot and M-vein spots is not actually contrasted—like in *E. s. colorata*. HW upperside is very dark, reddish spots usually obscured and short. The external side of the spots is narrowed and sharp, but the internal sides are practically straight, forming a line. The anal angle is not developed, the anal side of the wing is practically straight; the whole shape of the butterfly is unusual. FW underside with reddish area, discal line is dark and slightly

whitish-scaled on the apex and costal side. The visible darkened suffusion lies between the more or less darker median part of the wing and the brighter submarginal part. The HW underside usually with a long discal line and a well developed median band bordered by dark lines. The median line on the external side is shaded by whitish suffusion which is not dense and not aggregated as separated spots. The marginal line is completely absent. Veins are darkened.

Genitalia: fig. 9. The valva is short with a long spined ridge. The brachia is a bit shorter than in other species.

♀. FW length 17–19 mm. Similar to the male but with narrowing wings and darker. FW usually with a completely darkened reddish area, only in the submarginal part something is visible. HW upperside practically without reddish spots. Underside lighter, median band on the HW is more contrasting and also without any traces of a marginal line. Genitalia: figs. 8e, l.

#### Distribution and biology

*E. p. progne* was described from Kichik-Alai Mts. New records from this range are not available. We have studied the type of this taxon (The Natural History Museum, London) and can confirm the identifications that have been made by WARREN, TSHIKOLOVETZ, and afterwards. However, WARREN noted that the nominate butterflies had a very extensive red coloration. In view of this it is impossible to confirm the usual determination of *E. progne* as nominate. Compared with the specimens from Transalai Mts. butterflies from Taldyk Pass are larger and may be slightly brighter but only statistically. Other subspecific characteristics figured in TSHIKOLOVETS' description are not real. As long as only these two populations of this species are actually known we can neither confirm the status of *E. p. samodurovi* nor can we deny it. We have verbal records of Mr. KOLESNICHENKO who collected several small *Erebia* belonging to the *radians*-group in the West Transalai across the upper stream of the Altyn-Dara River (several miles to the south from the well-known Aram-Kungei Valley, closer to the main chain of the range). Unfortunately, these butterflies were missed.

#### Biology

The butterflies occur on humid (even swamped) alpine grassland slopes.

#### Etymology

"progne" can be translated from Latin as descendant, bom.

#### Discussion

##### Male genitalia

We dissected totally about 60 ♂♂ (and 15 ♀♀). It is necessary to note that there is a distinction in genitalia but not as significant for taxonomic purposes as external distinctions. Practically all characteristics are very variable: the width and length of the valva, length and density of spines, length of the uncus and brachia, etc. Even the angle between distal and proximal parts of the spined ridge is variable: sometimes the dorsal line of the ridge is straight (fig. 2i, fig. 3h). Mostly all differences are notable in volume and this presents another difficulty if we want to use them. Unusual form of the brachia is the main characteristic of the whole group: they are long and worm-shaped. The uncus is equal in width throughout. The valva with a spined ridge

which has a very variable form, sometimes straight but usually with a more or less expressed finger-shaped blade. The main differences between the three species are as follows: proportion of the length of the spined ridge to the length of the not-spined part (fig. 2, fig. 3) is 1.1–1.3 : 1 in *E. progne*, 0.85 : 1 in *E. sokolovi* (except *E. s. severa*, 0.75 : 1) and 0.65 in *E. radians*. (except *E. r. uzungyrus* 0.75 : 1). It is to be noted that we measured only 4 specimens of *E. r. uzungyrus*. The valva of *E. progne* is distinctly shorter and wider (figs. 9a, b, c, d).

It is more important to note that the density of spines in *E. sokolovi* is obviously higher than in *E. radians* (see fig. 6), the spines being present on the inner surface of the distal blade of the valva. In *E. radians* such spines are absent and the costal widening of the ridge is not so developed, especially in the proximal (inner) part where the spines are usually placed in one row—these differences are shown in the fig. 4, *E. r. uzungyrus* and *E. s. sokolovi* taken as examples. We have noted above that the distal blade of the valva of *E. r. uzungyrus* is always finger-shaped and very well developed.

No doubt, the form of the brachia is very important when species are separated in nature, but the very complicated volume structure makes it impossible to use this feature for identification. It may be easier to distinguish *E. progne* by the brachia which are unusually short and practically not-curved in the distal part (fig. 9f). Brachia in *E. radians* are slightly shorter than in *E. sokolovi* but it is impossible to compare their real length. It is interesting to note that the brachia of *E. s. sokolovi* are obviously thin, the diameter being sometimes 1.5 less than in other subspecies, narrowed at the ends and commonly sharply pointed (figs. 1b, f). In all other subspecies the brachia has the same diameter as in *E. radians*, not narrowed towards the sharp tip and with a even more or less visible enlarging at the ends (figs. 1d, e). Brachia in *E. radians* without such enlarging, the diameter is practically the same throughout (figs. 1a, c, g). Aedeagus provides a distinction (fig. 5): in *E. sokolovi* it has no true curving in the narrowed distal part and in *E. radians* such a curving is developed (except *E. r. uzungyrus*) while in all subspecies the aedeagus is enlarged in the distal part. All other characteristics are very variable.

In general two conclusions can be drawn: in *E. sokolovi* the nominate subspecies has a certain distinction separating this butterfly from all others; the same is true for *E. r. uzungyrus* among other subspecies of *E. radians*.

#### Female genitalia

We have not found a terminology to separate the details of the structure of the female genitalia in this group, they have never been described. So, we have to use the names of our own. Antevaginal plate in this group without actual distinctions. Antrum has a Y-shaped sclerite, a very variable structure whose total shape may be used for identification within certain limits; this sclerite will be further referred to as “fork”. The main distinctions have been disclosed in the structure of the postvaginal plate. In the center of this plate two central rounded sclerites are present. Two more or less developed ridges are located around the central sclerites towards the base of the leg of the “fork”. We concluded that the muscles moving the “fork” are fastened to these ridges.

In *E. r. radians* and *E. r. zhdankoi* the whole shape of the fork is not triangular, the width of the leg is 1.5 times less than the width of the apical (distal) end. The ridges on the postvaginal plate are very well developed and separated from the central rounded sclerites by a long membranous area. In *E. r. uzungyrus* this structure is very unusual: the “fork” has a very narrow base of the leg and along the whole plate the additional sclerite is available; this sclerite is being connected with the “fork”’s leg and with ridges. We have only one female of this taxon—so,

if this distinction is not an aberration and may be confirmed later, it will be a confirmation that this taxon is a good species.

In *E. sokolovi* the shape of the "fork" is triangular, the leg usually half the size of the distal part. The ridges are not so developed, short and usually not strong, therefore the membranous area is present only around the leg of the "fork". In *E. s. sokolovi* the ridges are more developed and have practically the same length as in *E. radians* but the area between the rounded central sclerites is sclerotized.

*E. progne* has a very short "fork", the central sclerites are not rounded with a straight external line. We were allowed to dissect only one female of this species (it was a paratype of *E. p. samodurovi*), so we are not in a position to decide whether these distinctions are permanent or not.

Two conclusions may be drawn: the main characteristics of the female genitalia are disclosed in the structure which ensures the functions of the "fork"; generally, the species of our group can be determined easier when using the genitalia of females than those of males. The female genitalia of *E. r. uzungyrus* and *E. s. sokolovi* have some distinctions that differ from other relative subspecies.

*E. radians* is mostly distributed in the Alai (and Transalai) mountain systems where the nominate subspecies occurs. Out of this range *E. radians* penetrates to Tian-Shan where it is represented by two distinctive races: ssp. *zhdankoi* from the Inner Tian-Shan (and partly from Fergansky Mts.) and ssp. *uzungyrus* from the western edge of the North Tian-Shan. The last subspecies has some unusual characteristics in the colouring of the wings and in genitalia (especially females) distinguishing them from other subspecies.

*E. sokolovi* includes four known subspecies divided in two units: one (the nominate) from the North-West Tian-Shan and another from the Inner Tian-Shan. The last unit comprising three new subspecies can be distinguished by the more or less reduced marginal line and a more silver-scaled underside of the HW; the upperside of the FW without obvious border between darker median and brighter submarginal parts of the reddish area. Some differences in genitalia are also present but it is difficult to say how important they are; generally, all differences distinguishing *E. s. sokolovi* are not so cardinal as in the case of *E. r. uzungyrus*.

Among the Inner Tian-Shan subdivision the differences are not so evident, but distinctive. *E. s. severa* described from West Kokshaal is the biggest one, it is silver-scaled on the underside; the veins on the FW upperside are well contrasting with the reddish colour; the basal line on the underside is more or less reduced.

*E. s. colorata* occurring between Baidulu and Naryn Mts. is slightly smaller but brighter on the upperside; the red area is full and usually not divided to separate spots.

*E. s. arcana* is distributed at the eastern edge of the areal of the species, practically in the Central Tian-Shan. This butterfly is very dark and small, and in some characteristics resembles the nominate subspecies and *E. progne*. An unusual hue of the underside colour and a further reduction of the marginal dark line were noted as well.

There are no confirmed records of collected *E. sokolovi* from Alai, but we cannot exclude such a possibility in the future.

As we reported above, we have roughly studied the series of this species from Zailiisky Alatau and determined these butterflies to be very close or even identical to *E. s. colorata*. Unfortunately, we had no possibility to dissect the insects, therefore we cannot include this material in

the present paper. Populations from Ketmen Mts. are probably similar to the previous specimens (ZHDANKO, 1977). One old series is known from Yulduz (TSHIKOLOVETS, 1992) but we doubt about the locality, having in mind that such butterflies are not known from the Sary-Dzhaz River.

*E. progne* is known recently only in the North Pamirs and the bordering area while the type series originated from the Kichik-Alai Mts.

All species may be easily recognized by their coloration of the underside; distinctions of the upperside are mostly subspecific. Distinctions in genitalia exist, but in the case of males it is not so easy to use them for practical identification.

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# Explanation of colour plate I (p. 383):

- Fig. 1: *E. radians radians*, ♂, W. Transalai, Altyn-Dara r., Aram-Kungei vall., 3000–3300 m, 5.VII.1989, leg. S. CHURKIN.
- Fig. 2: *E. radians radians*, ♂, East Alai, upper stream of Alaiku r., Kashkasu loc., 2900 m, 15.VII.1992, leg. G. SAMODUROV.
- Fig. 3: *E. radians radians*, ♀, Transalai, Altyn-Dara r., Aram-Kungei vall., 3000–3300 m, 10.VII.1994, leg. L. CHURKINA.
- Fig. 4: *E. radians zhdankoi* subsp. nov., holotype ♂, Int. Tian-Shan, SW edge of At-Bashi Mountains, near Chatyr-Kel L., Karasu r., 3700–3900 m, 24.–27.VII.1998, S. CHURKIN leg.
- Fig. 5: *E. radians zhdankoi* subsp. nov., paratype ♂, same data.
- Fig. 6: *E. radians zhdankoi* subsp. nov., paratype ♀, same data.
- Fig. 7: *E. radians uzungyrus* subsp. nov., holotype ♂, Tian-Shan, Kirgizsky Mts., Uzungyr, Chon-Kurchak r., 2700 m, 15.VII.1991.
- Fig. 8: *E. radians uzungyrus* subsp. nov., paratype ♂, Kirgizsky Mts., Shamsi Pass, 2800 m, 7.VII.1983, V. GANSON leg.
- Fig. 9: *E. radians uzungyrus* subsp. nov., paratype ♀, same data as in fig. 8.
- Figs. 10–18: the same as 1–9, undersides.

Explanation of colour plate II (p. 385):

- Fig. 1: *E. sokolovi sokolovi*, ♂, Tian-Shan, Talassky Alatau Mts., Alabel Pass, 3800 m, 29.VII.1991, I. PLUSHCH leg.  
 Fig. 2: *E. sokolovi sokolovi*, ♂, Tian-Shan, Kirgizsky Mts., 30 km S from Merke, Sandyk vall., 3200 m, 6.VIII.1998, A. ZHDANKO leg.  
 Fig. 3: *E. sokolovi sokolovi*, ♂, Tian-Shan, Talassky Alatau Mts., Alabel Pass, 3200 m, 14.VII.1997.  
 Fig. 4: *E. sokolovi colorata* subsp. nov., holotype ♂, Int. Tian-Shan, Moldo-Too Mts., 10 km S from Song-Kel L., Moldoo Pass, 23.VII.1998, A. GROMENKO leg.  
 Fig. 5: *E. sokolovi colorata* subsp. nov., paratype ♂, Int. Tian-Shan, Baidulu Mts., Dolon Pass, 3200–3250 m, 25.VI.–14.VII.1976, G.SAMODUROV leg.  
 Fig. 6: *E. sokolovi colorata* subsp. nov., paratype ♀, same data as fig. 5.  
 Fig. 7: *E. sokolovi severa* subsp. nov., holotype ♂, Int. Tian-Shan, West edge of Kokshaal Range, Sary-Beles Mts., upper stream of Kuldzha-Bashi r., 18.–21.VII.1998, 3700–3800 m, S. CHURKIN leg.  
 Fig. 8: *E. sokolovi severa* subsp. nov., paratype ♂, same data as fig. 7.  
 Fig. 9: *E. sokolovi severa* subsp. nov., paratype ♀, same data as fig. 7.  
 Figs. 10–18: the same as 1–9, undersides.

Explanation of colour plate III (p. 387):

- Fig. 1: *E. sokolovi arcana* subsp. nov., holotype ♂, Tian-Shan, Dzhetim-Bel Mts., Ekurgun-Kel L., 3700–4000 m, 5.–12.VII.1993, V. VASILIEV leg.  
 Fig. 2: *E. sokolovi arcana* subsp. nov., paratype ♂, same data as fig. 1.  
 Fig. 3: *E. sokolovi arcana* subsp. nov., paratype ♀, same data as fig. 1.  
 Fig. 4: *E. progne samodurovi*, paratype ♂, Transalai Mts., Kyzyl-Art Pass, 4000 m, 14.VII.1981, G. SAMODUROV leg.  
 Fig. 5: *E. progne samodurovi*, paratype ♂, same data as fig. 4.  
 Fig. 6: *E. progne samodurovi*, paratype ♀, same data as fig. 4.  
 Fig. 7: *E. progne progne*, ♂, Alai Mts., Taldyk Pass, 27.VII.1989, 3700 m, I. PLUSHCH leg.  
 Fig. 8: *E. sokolovi severa* subsp. nov., paratype ♀, same data as fig. 9 of colour plate II.  
 Fig. 9: *E. radians radians*, ♂, E. Transalai, 10 km N. from Kyzyl-Art Pass, 3750–3850 m, 10.–15.VII.1981, leg. G. SAMODUROV.  
 Figs. 10–18: the same as 1–9, undersides.

1	4	7
2	5	8
3	6	9
10	13	16
11	14	17
12	15	18

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